



## Site 3 – Lytchett Matravers, Dorset

### Highways, Flood Risk, Drainage and Utilities Technical Note

Project No.	0657
Revision	B
Date	27 October 2017
Client	Wyatt Homes
Prepared	T Ball / A Hanks
Checked	C Yalden / A Wozniczko
Authorised	I Awcock
File Ref.	P:\0657 Purbeck promotion sites for Wyatt\C Documents\Reports\0657 Site 3 (Purbeck Promotion Sites)- Highways, Flood Risk, Drainage and Utilities - Technical Note.docx

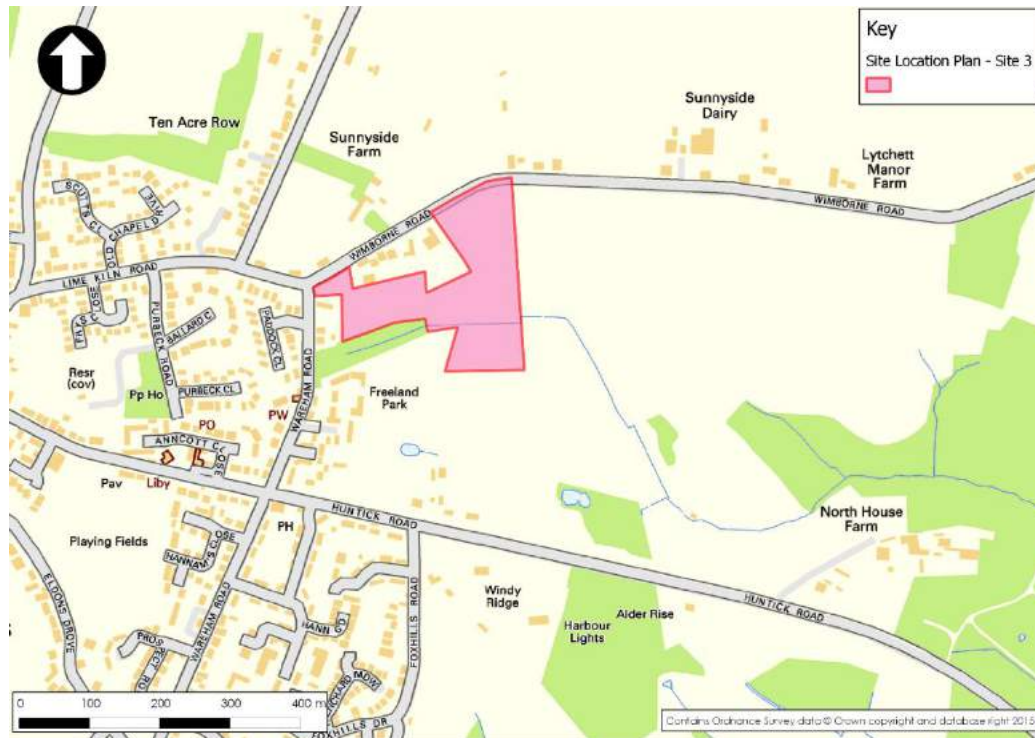
## 1 Introduction

- 1.1 Wyatt Homes are reviewing opportunities for the promotion of new residential development, comprising of approximately 60 dwellings, on greenfield land to the east of Blaneys Corner (intersection of Wimborne Road and Wareham Road), Lytchett Matravers, Dorset. A copy of the proposed framework masterplan is included within Appendix A of this technical note.
- 1.2 This Technical Note has been prepared to support the proposed allocation of the site within the emerging Partial Review Local Plan. It identifies existing highways, flood risk, drainage and utility opportunities and constraints, and proposes preliminary strategies for access and drainage to facilitate development at the site.

## 2 Site Location

- 2.1 The site, as shown by Figure 2.1 below, is located on land to the east of Blaney's Corner, on the eastern fringe of Lytchett Matravers at National Grid Reference SY 949 956.

Figure 2.1 – Site Location plan



## 3 Existing land uses

- 3.1 The existing site comprises undeveloped greenfield land with established hedgerows forming boundaries within the site and at its perimeter. The site comprises two distinct catchments, referred to as 'northern' and 'southern' through this report. Each catchment falls and drains towards a minor watercourse which flows in an easterly direction through the site.

## 4 Surrounding land use

- 4.1 The site is surrounded by the following existing land uses:
- To the north lies existing residential properties on Wimborne Road, with Sunnyside Farm (Promotion Site 2) beyond.
  - To the east of the site lies undeveloped greenfield land.

- To the south of the site lies the Freeland Park commercial site, along with surrounding areas of undeveloped greenfield land.
- To the west lie existing residential properties on Wareham Road, with the village centre beyond.

## 5 Topography

- 5.1 A topographic survey has been undertaken and indicates that the northern site catchment falls in a southerly direction, from a high point of 80m above ordnance datum (AOD), to a low point of 68m AOD. The majority of this catchment has an average gradient between 1 in 20 and 1 in 25, however this steepens to 1 in 6 on approach to the existing watercourse.
- 5.2 The southern site catchment falls in a northerly direction, from a high point of 77m AOD, to a low point of 68m AOD, with a variable gradient between 1 in 6 and 1 in 20.
- 5.3 Areas benefitting from shallower gradients are unlikely to require any significant earthworks or retaining elements to accommodate future development, whereas the areas of steeper topography would require localised earthworks and potential retaining structures to support future development.
- 5.4 A copy of the existing site survey can be seen on drawing 0657-CNS-101 within Appendix B of this technical note.

## 6 Transport, Access and Movement

- 6.1 The site is located immediately to the south/east of Wimborne Road towards the north of Lytchett Matravers. This site has two frontages, one within the 30mph limit and the other in the 40mph limit. Figure 6.1 (included within Appendix C of this Technical Note) highlights the location of the site with respect to existing local facilities in Lytchett Matravers with approximate walking distances/times.
- 6.2 The centre of Lytchett Matravers is located approximately 400m (5 minutes' walk) to the south/west of the site. This includes a number of local facilities including a Tesco Convenience store, post office, library, GP surgery, pharmacy, and Parish Hall.
- 6.3 The local Primary School is located on Wareham Road within around 900m (11 minutes' walk) of the site, together with further convenience retail opportunities.
- 6.4 The nearest bus stop accessible using the footway network is positioned on Lime Kiln Road around 180m (around 2 minutes' walk) from the site. This is served by

bus route 10 which provides an hourly service between Lytchett Matravers and Poole town centre (via Poole railway station) throughout the day.

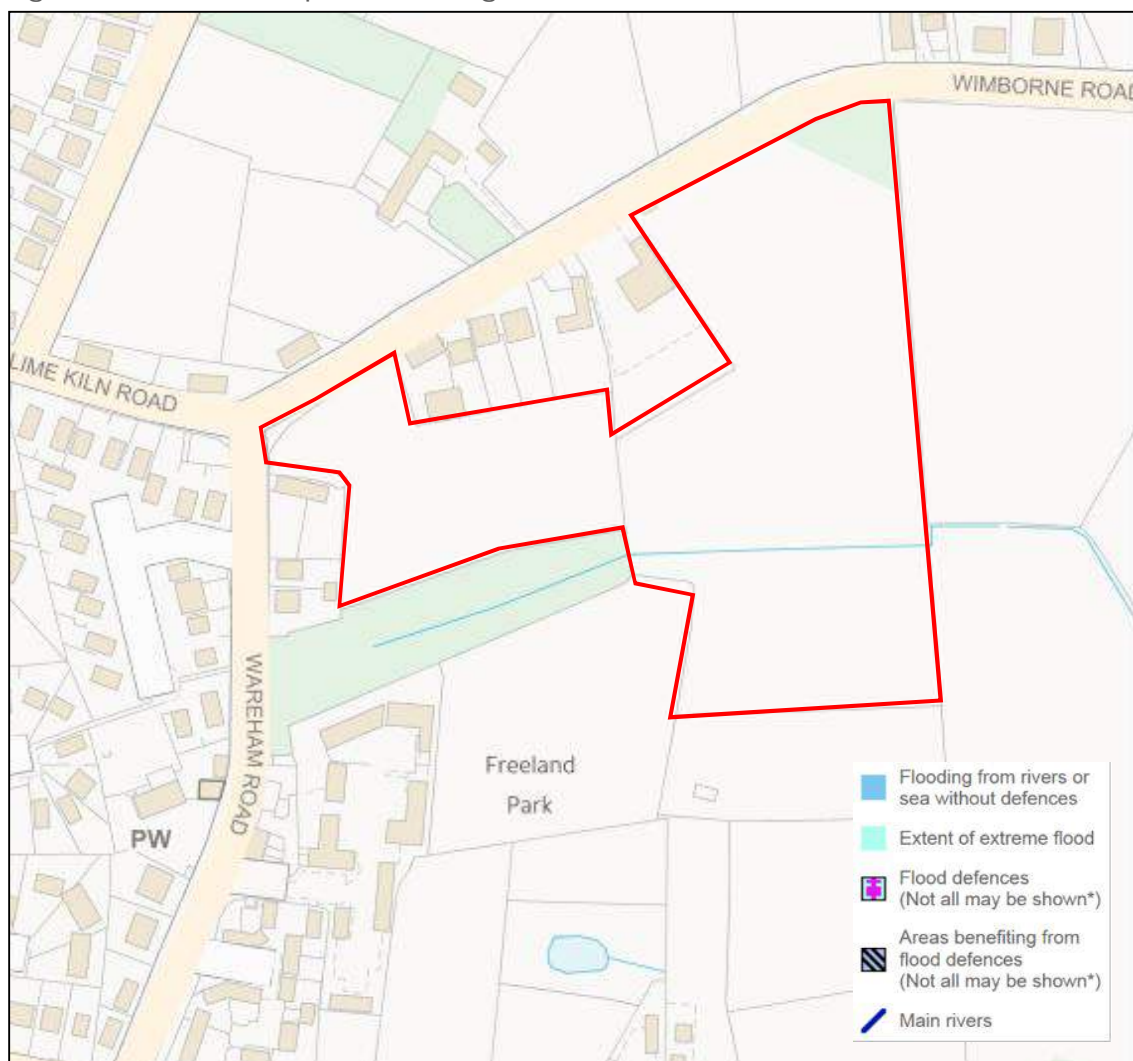
- 6.5 For secondary education, the site falls within the catchment of Lytchett Minster School approximately 1.5km to the south east of Lytchett Matravers. This is accessible by school bus service 718 which also departs from the Lime Kiln Road stop.
- 6.6 In summary, the site is considered to be accessible to a range of local facilities in Lytchett Matravers within a reasonable walking distance, including primary education, convenience retail and health services. The existing public transport links to Lytchett Minster School and Poole Town Centre would also provide good opportunities to travel to larger education, retail, employment and health facilities further afield using a sustainable mode of travel. Clearly, development at the site would generate an increase in potential patronage for local bus services that would help to underpin their viability.
- 6.7 The site is therefore considered to be positioned in an accessible location as required by the NPPF, and that there would be good opportunities for residents to use sustainable modes of travel to meet their everyday needs.
- 6.8 The longest section of the site's frontage along Wimborne Road is situated to the east of the British Legion site within the existing 40mph zone where the carriageway width is in the order of 6m. Drawing SK-04 attached as Appendix D of this Technical Note shows how a vehicular access could be achieved at this location by means of a simple priority junction. The access strategy would include an extension of the existing 30mph limit to include the site frontage and reflect the new extent of development along the route into Lytchett Matravers. Drawing SK-04 therefore shows visibility splays of 2.4 x 43m in line with Manual for Streets Guidance for 30mph traffic rather than the existing limit.
- 6.9 Pedestrian access to the site could be provided at the same location by means of a new footway adjacent to the main access road. This would connect with the existing footway on the southern side of Wimborne Road. Access to the village centre and primary school beyond to the south could then be achieved using the existing footway network at Lime Kiln Road, Wareham Road, Purbeck Road and Purbeck Close.
- 6.10 There is also the potential for a secondary pedestrian access to be provided to the existing footway network at Wimborne Road at the western frontage close to the junction with Wareham Road (Blaneys Corner).
- 6.11 It is therefore considered that a safe and suitable means of access to the site could be provided as required by the NPPF.

6.12 Existing traffic flows within Lytchett Matravers are anticipated to be relatively low, and it is considered that the development of the site is unlikely to result in a significant change in traffic conditions in the centre of the village or offer the potential for any severe traffic impacts.

## 7 Flood Risk

7.1 An extract of the Environment Agency’s (EA) ‘Flood Risk from Rivers or Sea’ mapping is reproduced below as Figure 7.1. This mapping shows the entire site to be within Flood Zone 1, as land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).

Figure 7.1 – Flood Map for Planning

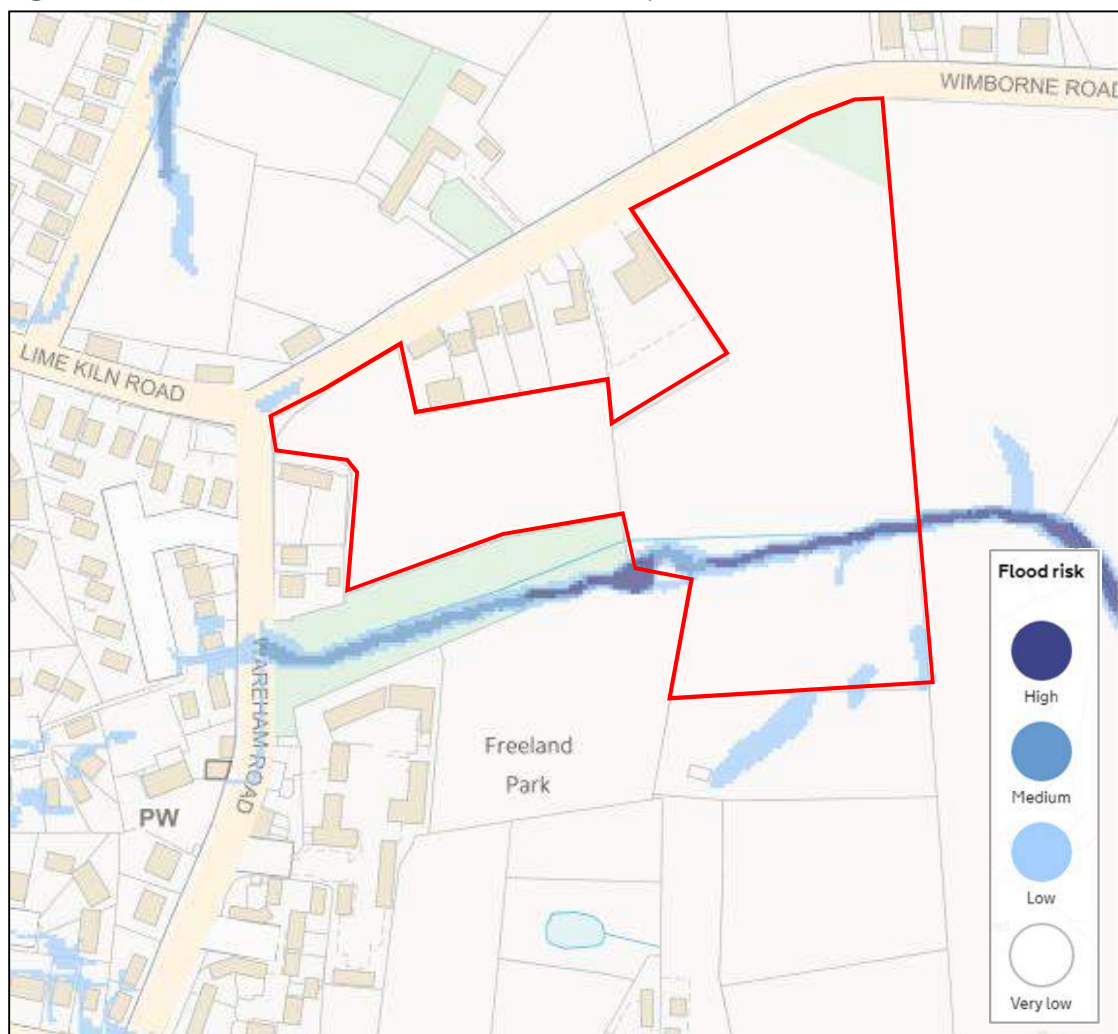


7.2 The EA’s ‘Flooding from Surface Water’ mapping (Figure 7.2) indicates that the majority of the site is within an area at very low risk of flooding from surface water (less than 0.1% chance of flooding each year), with the exception of the area adjacent the eastern perimeter of the site, which shows a high risk of flooding

(greater than 3.3% chance of flooding each year) along the line of the existing watercourse. Given this area would not be developed, the site should not be impacted by existing flooding from surface water throughout its lifetime.

- 7.3 The EA's 'Flooding from Surface Water' mapping (Figure 7.2) indicates that the majority of the site is within an area at very low risk of flooding from surface water (less than 0.1% chance of flooding each year), with the exception of the area immediately adjacent the existing watercourse, which shows a high risk of flooding (greater than 3.3% chance of flooding each year). Given this area would not be developed, the site should not be impacted by existing flooding from surface water throughout its lifetime.

Figure 7.2 – Flood Risk from Surface Water map



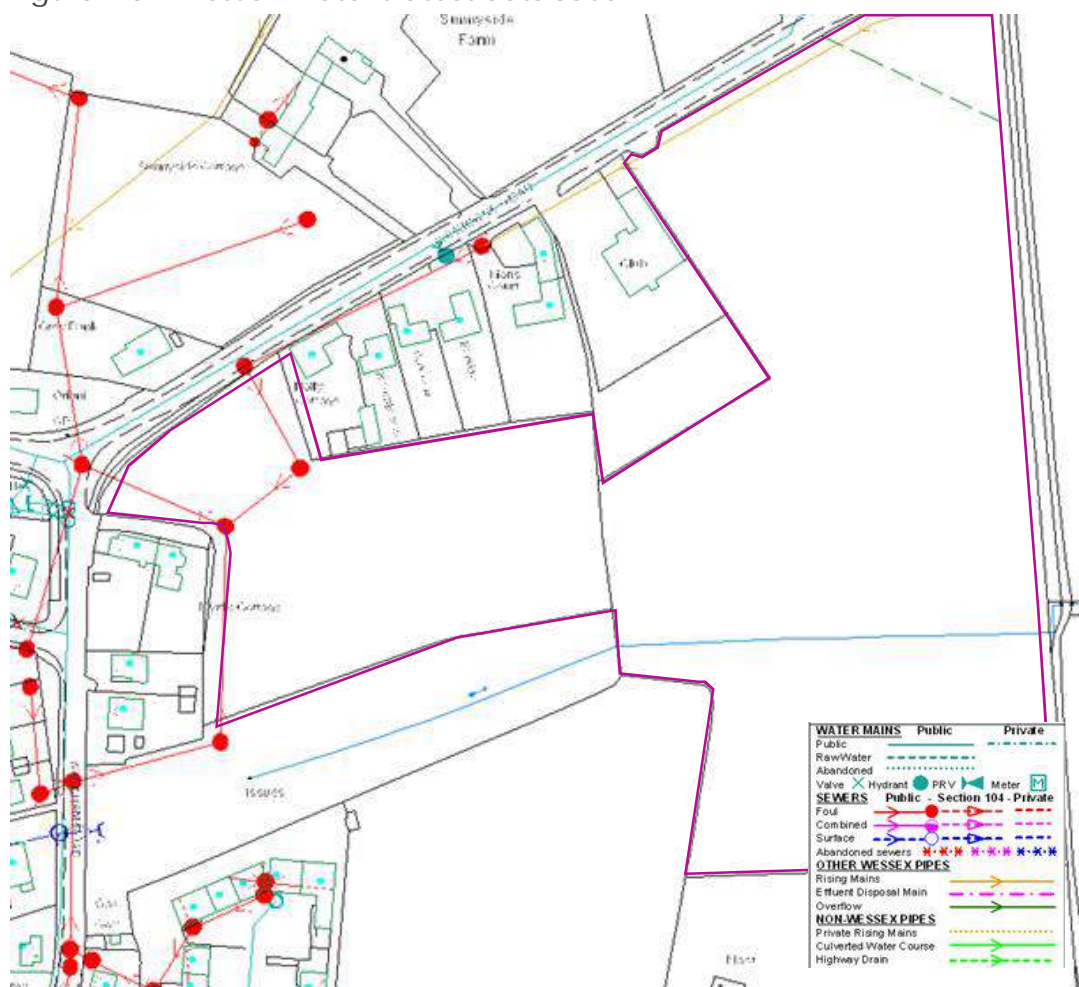
Existing site drainage

- 7.4 An existing minor watercourse flows eastwards between the northern and southern catchments of the site.
- 7.5 The minor watercourse continues beyond the site, towards the Sherford River and the Lytchett Bay area of Poole Harbour beyond.

Existing drainage infrastructure

- 7.6 An extract of the Wessex Water (WW) asset record data for this area has been included as Figure 7.3 of this report. The records show an existing 150mm diameter foul sewer within the north-west extents of the site and an existing foul rising main adjacent the north-eastern boundary at Wimborne Road.
- 7.7 If this sewer and rising main are to be retained (and not diverted) they would need to be accurately traced, with no buildings permitted within 3m of the sewer and 6m of the rising main, and no tree planting permitted within 6m of either.

Figure 7.3 – Wessex Water’s asset database



#### Ground conditions

- 7.8 A ground investigation has yet to be undertaken. However, a desktop review of the Soilscape Dataset indicates that the site is underlain by 'slightly acid loamy and clayey soils with impeded drainage' and therefore soakaways are unlikely to present a viable method of surface water disposal for this site. Instead, on-site attenuation combined with off-site discharge is considered to be the most appropriate drainage solution.
- 7.9 Confirmation of the drainage characteristics would need to be verified by BRE Digest 365 compliant soakaway testing in advance of a Flood Risk Assessment to support any future planning application for this site.

#### Proposed foul water drainage

- 7.10 Wherever possible, foul flows from the proposed development will discharge to the existing gravity sewers within the site. Any residual development which is unable to discharge to these sewers would gravitate towards the low point of the site where it is envisaged a new adoptable sewage pumping station (SPS) will be required.
- 7.11 The proposed SPS would require an approximate compound area of 12m x 8m and must be located at least 15m from any habitable building. The compound must be accessed directly from the adopted carriageway or otherwise an independent private access (not to be shared with any other development use).
- 7.12 Connectivity to the existing foul sewerage network would represent a 30% increase in total flows and would therefore be subject to further assessment by WW, to consider any reinforcement requirements.
- 7.13 Exact points of connection can be agreed within Wessex Water once a detailed site layout is available.
- 7.14 A copy of any correspondence with Wessex Water has been included within Appendix E.

#### Proposed surface water drainage

- 7.15 The proposed developable area for this site has been established through consultation with NEW Masterplanning and includes consideration towards any existing topographical, utility and arboricultural constraints.
- 7.16 The pre-development greenfield run-off rate has been estimated using the MircoDrainage Source Control module, ICP SUDS method. This method is based on the IH 124 methodology, which is the best practice for greenfield sites.



7.17 A copy of the greenfield run-off assessment can be seen within Appendix F of this report, with the results summarised in Table 7.1 below;

Table 7.1 – Greenfield Runoff Rates

Return Period	Greenfield Runoff Rate (l/s)
2yr	8.7
30yr	22.5
100yr	31.6

7.18 To ensure any future development would be safe from flooding throughout its lifetime and that flood risk elsewhere is not increased, the greenfield runoff rates above must be replicated or reduced. This is achieved through the attenuation of surface water runoff within the site.

7.19 To calculate the attenuation storage requirements, it has been assumed that 60% of the developable area will be impermeable catchment. This offers a slightly conservative approach but is common practice until a site layout is available, allowing impermeable catchments to be measured more accurately.

7.20 The MircoDrainage Source Control module has been used to estimate the storage requirements for the proposed scheme. This modelling includes allowances for the Long-Term Storage volume, which aims to mitigate the impact of any increased volume of runoff, and has been calculated using equation 24.10 of CIRIA C753, shown within Appendix F of this technical note.

7.21 The output of the MicroDrainage model can be seen within Appendix F of this report, with the results summarised in Table 7.2 below;

Table 7.2 – Attenuation Storage Requirements

Proposed Attenuation Feature	Storage Volume (m <sup>3</sup> )
Northern Detention Basin/Pond	765
Southern Detention Basin/Pond	125
TOTAL	890

7.22 The attenuation storage volume must be provided within the application boundary. This storage can be provided as a single feature per catchment, located near the low point of the site, as reflected by drawing 0657-CNS-103 within Appendix B of this technical note, or it could be sub-divided into several smaller features if the site layout allows and this is a preferred approach.

7.23 The peak rates of discharge will be managed by a series of hydraulic controls, with the restricted outflow being discharged to the existing watercourse adjacent the eastern site boundary.

## 8 Utilities

8.1 An existing utility search was commissioned in May 2017 to establish which utility providers hold assets within the locality of the site.

8.2 The records received in response to this search show that an SSE high voltage (HV) overhead (OH) cable follows the eastern and most southern boundaries of the site.

8.3 Wimborne Road, to the north, contains multiple services, including underground (UG) low pressure (LP) gas main, UG Virgin Media telecoms, UG South West Water (SWW) water supply main, UG BT telecoms and OH low voltage (LV) SSE cable.

8.4 The existing utility records have been transposed on to drawing 0657-CNS-103 within Appendix B of this technical note.

8.5 Aside from the above, no additional utility services are known to pass through the site. It has been considered that the OH HV cables will be retained in-situ, given that they are unlikely to impact on any future development proposals.

8.6 We are currently liaising with utility providers to verify whether the existing available services have capacity to accommodate a development of this nature and to provide budget estimates for any likely diversion or reinforcement works.

8.7 The utility supply sheet included within Appendix G of this Technical Note, provides a summary of the utility responses received to date.

## 9 Conclusion

9.1 The site is considered to be accessible to a range of local facilities in Lytchett Matravers within a reasonable walking distance, including primary education, convenience retail and health services. The existing public transport links to Lytchett Minster School and Poole Town Centre would also provide good opportunities to travel to larger education, retail, employment and health facilities further afield using a sustainable mode of travel.

- 9.2 The site is therefore considered to be positioned in an accessible location as required by the NPPF, and that there would be good opportunities for residents to use sustainable modes of travel to meet their everyday needs.
- 9.3 The preferred location for a vehicular access to the site is likely to be along the longest section of frontage at Wimborne Road to the east of the British Legion site. This would include a new simple priority junction, and the extension of the existing 30mph limit to include the site frontage and reflect the new extent of development along the route into Lytchett Matravers.
- 9.4 Pedestrian access to the site could be provided at the same location to connect with the existing footway on the southern side of Wimborne Road. There is also the potential for a secondary pedestrian access to be provided to the existing footway network at Wimborne Road at the western frontage close to the junction with Wareham Road (Blaneys Corner).
- 9.5 It is therefore considered that a safe and suitable means of access to the site could be provided as required by the NPPF.
- 9.6 Existing traffic flows within Lytchett Matravers are anticipated to be relatively low, and it is considered that the development of the site is unlikely to result in a significant change in traffic conditions in the centre of the village or offer the potential for any severe traffic impacts.
- 9.7 A topographic survey has been undertaken and indicates that the majority of the northern site catchment benefits from an average gradient between 1 in 20 and 1 in 25, however this steepens to 1 in 6 on approach to the existing watercourse. The southern site catchment has a variable gradient between 1 in 6 and 1 in 20. Areas benefitting from shallower gradients are unlikely to require any significant earthworks or retaining elements to accommodate future development, whereas the areas of steeper topography would require localised earthworks and potential retaining structures to support future development.
- 9.8 The EA's 'Flood Risk from Rivers or Sea' mapping shows the entire site to be within Flood Zone 1, as land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
- 9.9 The EA's 'Flooding from Surface Water' mapping shows the developable extents of the site to be at 'very low risk' of flooding from surface water, with less than 0.1% chance of flooding each year.
- 9.10 A ground investigation has yet to be undertaken. However, a desktop review of the Soilscape Dataset indicates that the site is underlain by 'slightly acid loamy and clayey soils with impeded drainage' and therefore soakaways are unlikely to present a viable method of surface water disposal for this site.

- 9.11 Confirmation of the drainage characteristics would need to be verified by BRE Digest 365 compliant soakaway testing in advance of a Flood Risk Assessment to support any future planning application for this site.
- 9.12 The surface water strategy will be designed to ensure that the flood risk to downstream properties is not increased as a result of this development in up to the 1 in 100 year return period storm event, including the upper end 40% allowances for climate change.
- 9.13 The storm water runoff attenuation requirement must be provided within the application boundary as either a single feature per catchment (as shown on the current constraints plan), or as a series of smaller features, subject to final site layout and client preference.
- 9.14 The peak rates of storm water discharge will be managed by a series of hydraulic controls, with the restricted outflow being discharged to the existing watercourse adjacent the eastern site boundary.
- 9.15 A site-specific FRA will be prepared to support a future planning application which will conclude that the development will be safe from flooding for its design life and not increase the flood risk to any third parties.
- 9.16 An existing 150mm diameter adopted foul sewer and foul rising main can be found within the north western and north eastern extents of the site respectively. If these are to be retained (and not diverted) they would need to be accurately traced, with no buildings permitted within 3m of the sewer and 6m of the rising main, and no tree planting permitted within 6m of either.
- 9.17 Wherever possible, foul flows from the proposed development will discharge to the existing gravity sewer within the site. Any residual development which is unable to discharge to this sewer would gravitate towards the low point of the site where it is envisaged a new adoptable sewage pumping station (SPS) will be required.
- 9.18 The proposed SPS would require an approximate compound area of 12m x 8m and must be located at least 15m from any habitable building. The compound must be accessed directly from the adopted carriageway or otherwise an independent private access (not to be shared with any other development use).
- 9.19 Connectivity to the existing foul sewerage network would represent a 30% increase in total flows and would therefore be subject to further assessment by WW, to consider any reinforcement requirements.
- 9.20 Exact points of connection can be agreed within Wessex Water once a detailed site layout is available.

- 9.21 An existing utility search was commissioned in May 2017 to establish which utility providers hold assets within the locality of the site.
- 9.22 The records received in response to this search show that an SSE high voltage overhead cable follows the eastern and most southern boundaries of the site, whereas Wimborne Road, to the north, contains multiple services, including underground low pressure gas main, Virgin Media telecoms, South West Water supply main, BT telecoms and overhead low voltage SSE cable.
- 9.23 We are currently liaising with utility providers to verify whether the existing available services have capacity to accommodate a development of this nature and to provide budget estimates for any likely diversion or reinforcement works.

AWP

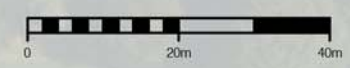


## Appendix A Proposed Framework Masterplan



Wimborne Road

existing Local Plan Allocation  
at Huntick Road



Blaney's Corner  
Lytchett Matravers  
Wyatt Homes

Framework Masterplan  
Drwg. no: 120\_DI\_01.0

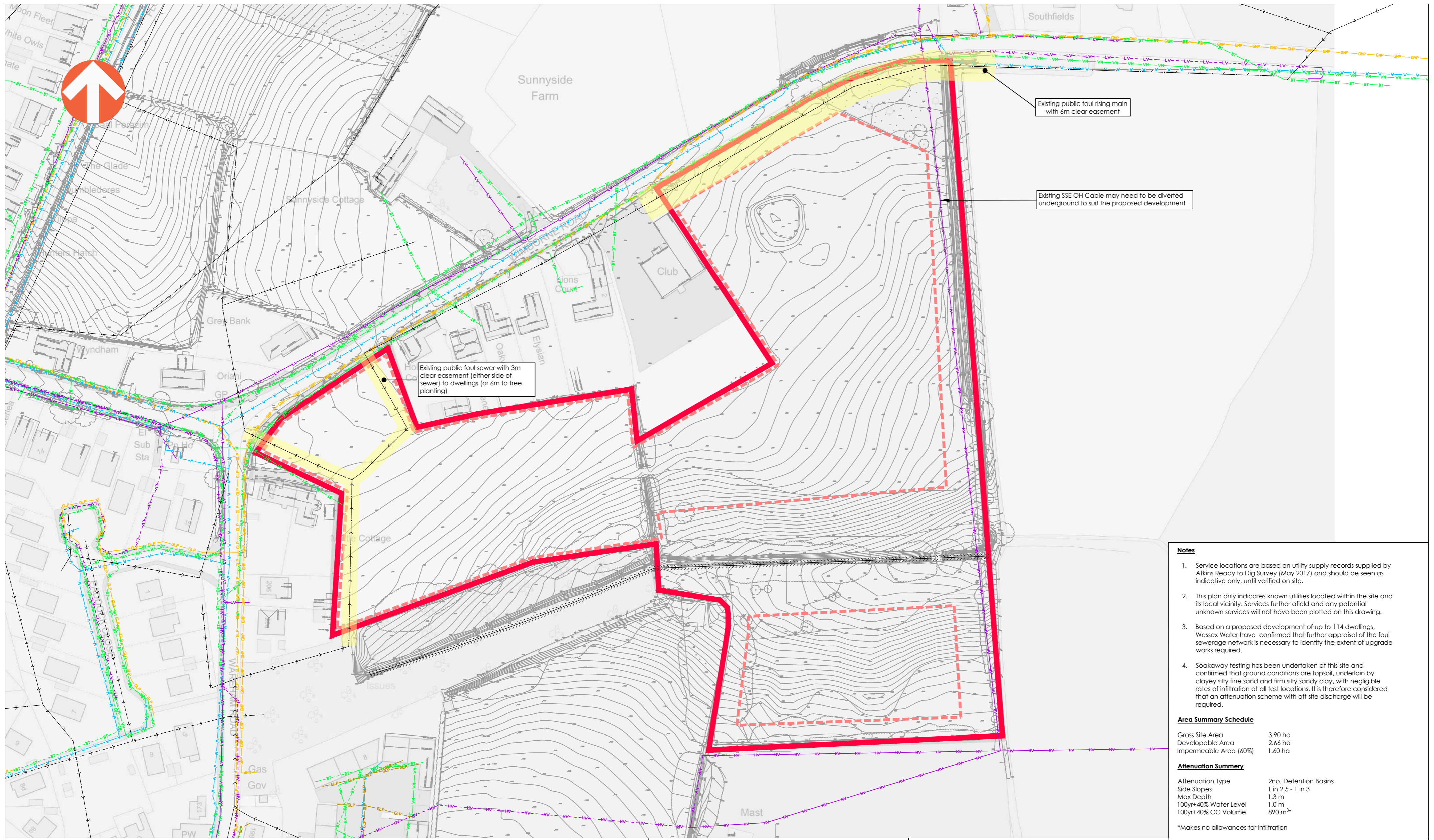
2017-07-11  
1:1000 @ A3  
DA ref: 120\_DA\_03.1

**NEW** masterplanning  
Second Floor 107 Bournemouth Road  
Poole, Dorset BH14 9HR  
+44 (0)1202 742228  
www.newmasterplanning.com



## Appendix B Drainage and Utilities Plan





Existing public foul rising main with 6m clear easement

Existing SSE OH Cable may need to be diverted underground to suit the proposed development

Existing public foul sewer with 3m clear easement (either side of sewer) to dwellings (or 6m to tree planting)

- Notes**
- Service locations are based on utility supply records supplied by Atkins Ready to Dig Survey (May 2017) and should be seen as indicative only, until verified on site.
  - This plan only indicates known utilities located within the site and its local vicinity. Services further afield and any potential unknown services will not have been plotted on this drawing.
  - Based on a proposed development of up to 114 dwellings, Wessex Water have confirmed that further appraisal of the foul sewerage network is necessary to identify the extent of upgrade works required.
  - Soakaway testing has been undertaken at this site and confirmed that ground conditions are topsoil, underlain by clayey silty fine sand and firm silty sandy clay, with negligible rates of infiltration at all test locations. It is therefore considered that an attenuation scheme with off-site discharge will be required.

**Area Summary Schedule**

Gross Site Area	3.90 ha
Developable Area	2.66 ha
Impermeable Area (60%)	1.60 ha

**Attenuation Summary**

Attenuation Type	2no. Detention Basins
Side Slopes	1 in 2.5 - 1 in 3
Max Depth	1.3 m
100yr+40% Water Level	1.0 m
100yr+40% CC Volume	890 m <sup>3</sup>

\*Makes no allowances for infiltration

Key		Existing Drainage	
	(Site 3) Blaneys Corner		Adopted Foul water sewer
	Developable Area		Adopted Surface water sewer
<b>Existing Utilities</b>			Adopted Foul Rising Main
	WW Distribution Main		Ditch
	SSE HV OH Cable		Easement either side of Foul Sewer
	SSE HV UG Cable		
	SSE LV UG Cable		
	SSE LV OH Cable		
	SSE OH EHV Cable		
	BT UG Cable		
	BT OH Cable		
	Virgin Media UG Cable		
	SGN Low Pressure Main		
	SGN High Pressure Main		

REV	DATE	DESCRIPTION	BY	CHK	APD
C	26.06.2017	Updated Detention Basin	PAB	JDLC	CPY
B	26.06.2017	Updated Detention Basin	PAB	JDLC	CPY
A	19.06.2017	Initial Issue	PAB	JDLC	CPY

CLIENT: WYATT HOMES

DRAWING STATUS: FOR INFORMATION ONLY

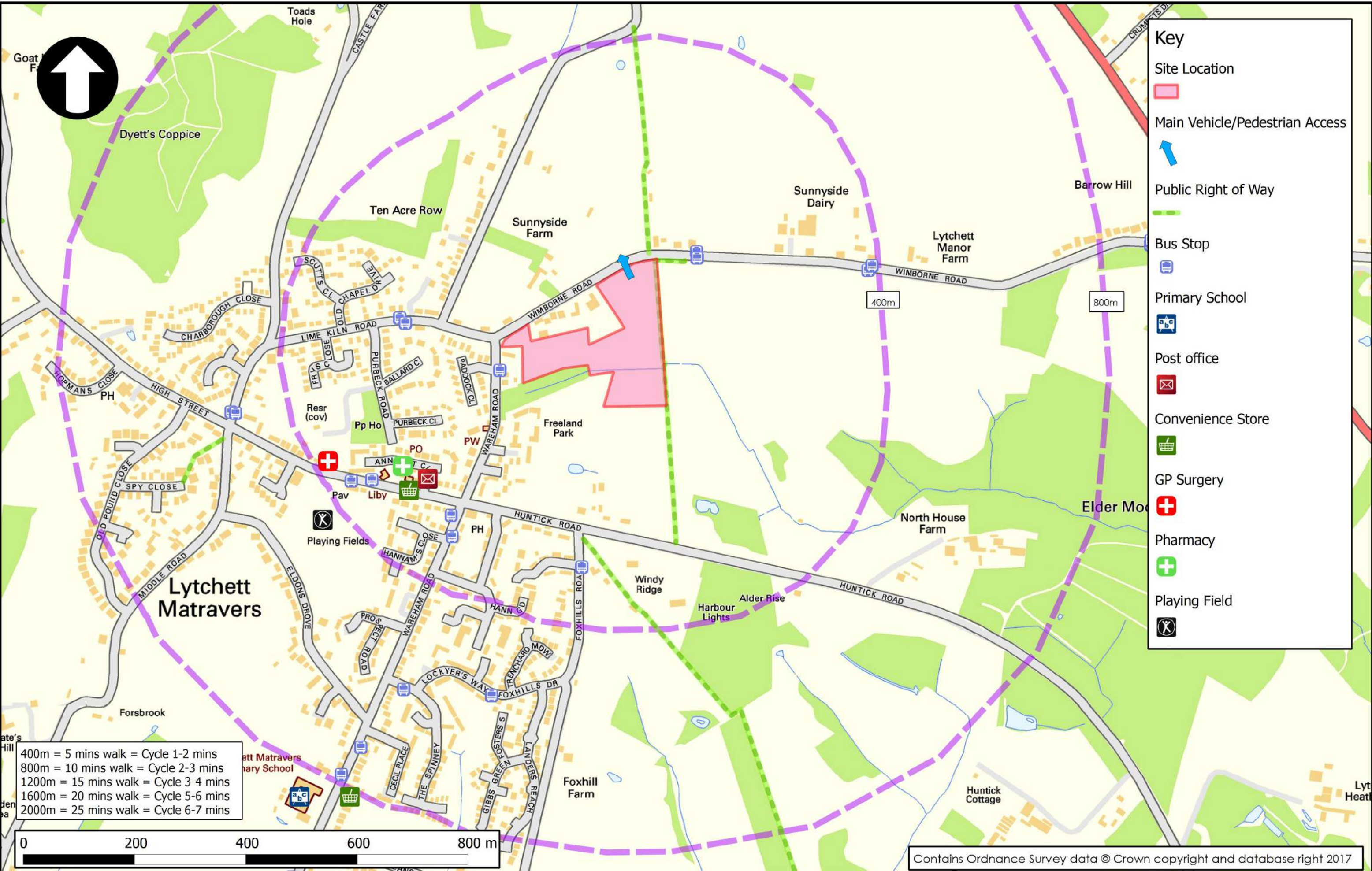
PROJECT: PURBECK PROMOTIONAL SITES		
TITLE: SITE CONSTRAINTS PLAN Site 3 Blaneys Corner		
PROJECT No: 0657	DRAWING No: CNS-103	REV: C
SCALE @ A2: 0 1:1000 50 metres		

DESIGN BY:

Awcock Ward Partnership, Kensington Court, Woodwater Park, Pynes Hill, Exeter, EX2 5TY  
Tel: 01392 409007 Web: [www.awpexeter.com](http://www.awpexeter.com)



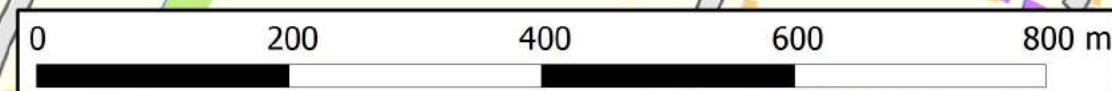
## Appendix C Local Facilities Plan



**Key**

- Site Location
- Main Vehicle/Pedestrian Access
- Public Right of Way
- Bus Stop
- Primary School
- Post office
- Convenience Store
- GP Surgery
- Pharmacy
- Playing Field

400m = 5 mins walk = Cycle 1-2 mins  
 800m = 10 mins walk = Cycle 2-3 mins  
 1200m = 15 mins walk = Cycle 3-4 mins  
 1600m = 20 mins walk = Cycle 5-6 mins  
 2000m = 25 mins walk = Cycle 6-7 mins



Contains Ordnance Survey data © Crown copyright and database right 2017



Lytchett Matravers (Site 3)  
 Accessibility Plan

Job number:	0657
Drawn:	IW
Checked:	AJW
Approved:	IDA

Figure 6.1



## Appendix D Frontage Access Plan (Drawing SK-04)



**Notes:**

Visibility splays to be kept clear of obstructions above 600mm.

PROJECT: LYTCHETT MATRAVERS PROMOTION SITES					
A	11.07.2017	INITIAL ISSUE	IW	AJH	AJW
REV	DATE	DESCRIPTION	BY	CHK	APD
CLIENT: WYATT HOMES					
DRAWING STATUS: FOR INFORMATION ONLY					

PRELIMINARY ACCESS ARRANGEMENT, (SITE 3 - BLANEY'S CORNER)		
PROJECT No:	DRAWING No:	REV:
0657	SK-04	A
SCALE @ 1:500		25 metres



Awcock Ward Partnership, Kensington Court, Woodwater Park, Pynes Hill, Exeter, EX2 5TY  
Tel: 01392 409007 Web: [www.awpexeter.com](http://www.awpexeter.com)



## Appendix E Correspondence with Wessex Water

Toby Ball

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From: Teddy Takyi-Amuah <Teddy.Takyi-Amuah@wessexwater.co.uk>  
Sent: 15 May 2017 12:01  
To: Jacob De la Croix  
Cc: Planning Liaison  
Subject: WW RESP :SY99NW\_12 Blaneys Corner

## CAPACITY RESPONSES

FAO Jacob.DelaCroix@awpexeter.com

Thank you for your enquiry regarding the proposed development of 114 new dwelling / units at the above site.

We have completed a preliminary capacity assessment and can provide the following details for your attention. Please refer to the plans below for information

### Foul Water disposal

- There is an existing 150 mm public foul sewer, which crosses north to south within the boundary of the proposed site.
- There is an existing rising main to the north east of the site, which crosses the boundary of the site.

We have a statutory duty to maintain and repair public sewers and we reserve the right to divert sewers where necessary. Sewers can be diverted under S185 Water Industry Act 1991 subject to satisfactory engineering proposals. We advise that the developer accurately locate these sewers & contacts our regional development team to discuss agreements for diversion proposals and sewer adoptions before detail design layouts are prepared and works are carried out.

- Please note; this is a significant project and will also require engineering appraisal and cost estimates.

These sewers must be accurately located on site before detail design works are carried out. Connection of the predicted foul drainage flow from 114 dwellings will represent a 30 % increase in flows to the local sewers and hence upgrade works appear apparent. Further engineering appraisal may be required to identify potential upgrade works required to accommodate flows from the development.

- A point of connection to be agreed to the afore mentioned sewers subject to detail site layout and the above.

### Surface Water disposal


Surface water to be discharged to local land drainage systems with agreed flood risk measures approved by the Lead Local Flood Authority. Surface water connections to the public foul sewer system will not be permitted, as surface water discharges to the public sewer will lead to sewer flooding.







## Appendix F Modelling Output

AWP		Page 1
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Purbeck Promotion Sites Greenfield Runoff Rates ICP SuDS (Site 3)	
Date 21/06/2017 15:05 File	Designed by michael.rose Checked by	
XP Solutions	Source Control 2016.1	

ICP SuDS Mean Annual Flood

Input

Return Period (years)    2    SAAR (mm)    875                    Urban    0.000  
Area (ha) 2.658                    Soil 0.370    Region Number    Region 7


**Results    1/s**

QBAR Rural    9.9  
QBAR Urban    9.9

Q2 years    8.7

Q1 year    8.4  
Q30 years    22.5  
Q100 years    31.6

# Long Term Storage (LTS) Volume Calculation

Project No.	0657	
Project Title	Purbeck promotion sites for Wyatt	
Client	Wyatt Homes	
	Site 3	
Calcs by	MR	
Reviewed by		
Date	21.06.2017	
Revision	B	

LTS calculation method based on equation 24.10 from CIRIA C753 - The SuDS Manual (2015);

$$Vol_{xs} = RD \times A \times 10 [PIMP/100 \times (\alpha \times Cv) + (1 - PIMP/100) \times (\beta \times SPR) - SPR]$$

Where;  $Vol_{xs}$  Extra runoff volume from a dev. site compared to the greenfield equivalent during the 100 yr 6 hr storm

RD	Rainfall Depth	70	mm (for 100 year 6 hour storm)
A	Site Area	2.658	ha (Exc. large undeveloped areas)
	Impermeable Catchment	1.595	ha
PIMP	Percentage Impermeable	60.0	%
$\alpha$	Proportion Impermeable to Network	1.0	
Cv	Impermeable Runoff Coefficient	0.84	(0.84 Modified Rational Method)
	Permeable Catchment	1.06	ha
	Permeable Catchment to Network	0.00	ha
$\beta$	Proportion Perm. to Network	0.00	
SPR	Soil Proportion Runoff	0.37	(Ref. to WRAP map)

$$Vol_{xs} = 70 \times 2.66 \times 10 \times \left( \left( \frac{60}{100} \right) \times (1.00 \times 0.84) + \left( 1 - \frac{60}{100} \right) \times (0.00 \times 0.37) - 0.37 \right)$$

Volume<sub>xs</sub> = **249.44**


LTS Discharge Rate = **5.32** (2 l/s/ha)

As above, assuming all permeable surfaces do not enter the drainage system

Volume<sub>xs</sub> = 249.44

As above, assuming all permeable surfaces enter the drainage system


Volume<sub>xs</sub> = 524.76

AWP		Page 1
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 2 year +40%	
Date 04/07/2017 14:40 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	

Summary of Results for 2 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	98.856	0.156	8.5	0.0	8.5	144.6	O K
30 min Summer	98.904	0.204	8.7	0.0	8.7	190.0	O K
60 min Summer	98.956	0.256	8.7	0.0	8.7	238.4	O K
120 min Summer	99.009	0.309	8.7	0.0	8.7	287.6	O K
180 min Summer	99.038	0.338	8.7	0.0	8.7	314.8	O K
240 min Summer	99.057	0.357	8.7	0.0	8.7	332.3	O K
360 min Summer	99.076	0.376	8.7	0.0	8.7	349.2	O K
480 min Summer	99.085	0.385	8.7	0.0	8.7	358.2	O K
600 min Summer	99.091	0.391	8.7	0.0	8.7	363.3	O K
720 min Summer	99.093	0.393	8.7	0.0	8.7	365.9	O K
960 min Summer	99.094	0.394	8.7	0.0	8.7	366.0	O K
1440 min Summer	99.081	0.381	8.7	0.0	8.7	354.8	O K
2160 min Summer	99.049	0.349	8.7	0.0	8.7	324.3	O K
2880 min Summer	99.012	0.312	8.7	0.0	8.7	289.8	O K
4320 min Summer	98.946	0.246	8.7	0.0	8.7	229.2	O K
5760 min Summer	98.898	0.198	8.7	0.0	8.7	184.3	O K
7200 min Summer	98.865	0.165	8.6	0.0	8.6	153.7	O K
8640 min Summer	98.846	0.146	8.3	0.0	8.3	135.7	O K
10080 min Summer	98.835	0.135	7.7	0.0	7.7	125.2	O K
15 min Winter	98.875	0.175	8.6	0.0	8.6	162.3	O K
30 min Winter	98.930	0.230	8.7	0.0	8.7	213.7	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	49.889	0.0	134.7	0.0	18
30 min Summer	33.320	0.0	183.7	0.0	33
60 min Summer	21.493	0.0	249.2	0.0	62
120 min Summer	13.603	0.0	317.1	0.0	122
180 min Summer	10.361	0.0	363.1	0.0	182
240 min Summer	8.532	0.0	399.1	0.0	240
360 min Summer	6.459	0.0	453.8	0.0	324
480 min Summer	5.295	0.0	496.4	0.0	384
600 min Summer	4.539	0.0	532.0	0.0	450
720 min Summer	4.002	0.0	562.8	0.0	516
960 min Summer	3.280	0.0	614.9	0.0	654
1440 min Summer	2.479	0.0	695.7	0.0	936
2160 min Summer	1.872	0.0	800.4	0.0	1340
2880 min Summer	1.534	0.0	874.1	0.0	1728
4320 min Summer	1.159	0.0	987.1	0.0	2460
5760 min Summer	0.950	0.0	1088.1	0.0	3120
7200 min Summer	0.813	0.0	1163.2	0.0	3816
8640 min Summer	0.716	0.0	1227.5	0.0	4496
10080 min Summer	0.643	0.0	1282.4	0.0	5152
15 min Winter	49.889	0.0	152.3	0.0	18
30 min Winter	33.320	0.0	207.1	0.0	33

AWP		Page 2
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 2 year +40%	
Date 04/07/2017 14:40 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	

Summary of Results for 2 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m <sup>3</sup> )	Status
60 min Winter	98.989	0.289	8.7	0.0	8.7	268.7	O K
120 min Winter	99.051	0.351	8.7	0.0	8.7	326.0	O K
180 min Winter	99.085	0.385	8.7	0.0	8.7	358.3	O K
240 min Winter	99.107	0.407	8.7	0.0	8.7	378.2	O K
360 min Winter	99.128	0.428	8.7	0.0	8.7	398.0	O K
480 min Winter	99.135	0.435	8.7	0.0	8.7	404.9	O K
600 min Winter	99.140	0.440	8.7	0.0	8.7	409.1	O K
720 min Winter	99.141	0.441	8.7	0.0	8.7	410.4	O K
960 min Winter	99.137	0.437	8.7	0.0	8.7	406.2	O K
1440 min Winter	99.113	0.413	8.7	0.0	8.7	383.6	O K
2160 min Winter	99.058	0.358	8.7	0.0	8.7	332.9	O K
2880 min Winter	98.994	0.294	8.7	0.0	8.7	273.9	O K
4320 min Winter	98.898	0.198	8.7	0.0	8.7	184.5	O K
5760 min Winter	98.848	0.148	8.5	0.0	8.5	137.4	O K
7200 min Winter	98.830	0.130	7.4	0.0	7.4	120.9	O K
8640 min Winter	98.818	0.118	6.6	0.0	6.6	110.0	O K
10080 min Winter	98.810	0.110	5.9	0.0	5.9	102.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Overflow Volume (m <sup>3</sup> )	Time-Peak (mins)
60 min Winter	21.493	0.0	279.9	0.0	62
120 min Winter	13.603	0.0	355.9	0.0	120
180 min Winter	10.361	0.0	407.4	0.0	178
240 min Winter	8.532	0.0	447.8	0.0	234
360 min Winter	6.459	0.0	509.0	0.0	344
480 min Winter	5.295	0.0	556.7	0.0	438
600 min Winter	4.539	0.0	596.6	0.0	472
720 min Winter	4.002	0.0	631.1	0.0	550
960 min Winter	3.280	0.0	689.4	0.0	706
1440 min Winter	2.479	0.0	779.6	0.0	1010
2160 min Winter	1.872	0.0	897.0	0.0	1452
2880 min Winter	1.534	0.0	979.8	0.0	1840
4320 min Winter	1.159	0.0	1107.0	0.0	2508
5760 min Winter	0.950	0.0	1219.1	0.0	3064
7200 min Winter	0.813	0.0	1303.3	0.0	3816
8640 min Winter	0.716	0.0	1375.7	0.0	4496
10080 min Winter	0.643	0.0	1438.0	0.0	5240

AWP		Page 3
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 2 year +40%	
Date 04/07/2017 14:40 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	


Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.329	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.595

Time (mins)		Area
From:	To:	(ha)
0	4	1.595

AWP		Page 4
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 2 year +40%	
Date 04/07/2017 14:40 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	

Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.700

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	930.0	1.300	930.0

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0144-8700-0450-8700
Design Head (m)	0.450
Design Flow (l/s)	8.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	144
Invert Level (m)	98.700
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200


Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.450	8.7
Flush-Flo™	0.211	8.7
Kick-Flo®	0.361	7.8
Mean Flow over Head Range	-	6.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.2	1.200	13.8	3.000	21.4	7.000	32.3
0.200	8.7	1.400	14.9	3.500	23.0	7.500	33.4
0.300	8.4	1.600	15.8	4.000	24.6	8.000	34.5
0.400	8.2	1.800	16.8	4.500	26.0	8.500	35.6
0.500	9.1	2.000	17.6	5.000	27.2	9.000	36.6
0.600	10.0	2.200	18.4	5.500	28.6	9.500	37.7
0.800	11.4	2.400	19.2	6.000	29.9		
1.000	12.7	2.600	20.0	6.500	31.1		

Orifice Overflow Control

Diameter (m) 0.120 Discharge Coefficient 0.600 Invert Level (m) 99.200


AWP		Page 1
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 30 year +40%	
Date 04/07/2017 14:39 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	

Summary of Results for 30 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	98.997	0.297	8.7	0.0	8.7	276.5	O K
30 min Summer	99.097	0.397	8.7	0.0	8.7	369.1	O K
60 min Summer	99.203	0.503	9.2	0.0	9.2	467.4	O K
120 min Summer	99.301	0.601	10.0	4.4	14.4	558.5	O K
180 min Summer	99.338	0.638	10.2	7.3	17.6	593.1	O K
240 min Summer	99.351	0.651	10.3	8.4	18.7	605.3	O K
360 min Summer	99.368	0.668	10.5	9.7	20.2	620.9	O K
480 min Summer	99.378	0.678	10.5	10.3	20.9	630.2	O K
600 min Summer	99.382	0.682	10.6	10.5	21.1	634.4	O K
720 min Summer	99.383	0.683	10.6	10.5	21.1	634.9	O K
960 min Summer	99.378	0.678	10.5	10.3	20.9	630.3	O K
1440 min Summer	99.359	0.659	10.4	9.0	19.4	612.5	O K
2160 min Summer	99.328	0.628	10.2	6.5	16.7	583.8	O K
2880 min Summer	99.299	0.599	9.9	4.3	14.3	557.5	O K
4320 min Summer	99.247	0.547	9.5	1.1	10.7	508.8	O K
5760 min Summer	99.180	0.480	9.0	0.0	9.0	446.6	O K
7200 min Summer	99.112	0.412	8.7	0.0	8.7	383.3	O K
8640 min Summer	99.038	0.338	8.7	0.0	8.7	314.1	O K
10080 min Summer	98.972	0.272	8.7	0.0	8.7	253.3	O K
15 min Winter	99.034	0.334	8.7	0.0	8.7	310.2	O K
30 min Winter	99.145	0.445	8.7	0.0	8.7	414.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	94.376	0.0	264.7	0.0	19
30 min Summer	63.470	0.0	358.6	0.0	34
60 min Summer	40.933	0.0	480.2	0.0	64
120 min Summer	25.625	0.0	602.6	19.5	122
180 min Summer	19.253	0.0	680.0	48.8	180
240 min Summer	15.632	0.0	736.6	72.5	222
360 min Summer	11.644	0.0	823.6	107.9	274
480 min Summer	9.438	0.0	890.3	131.2	338
600 min Summer	8.014	0.0	944.9	146.0	406
720 min Summer	7.008	0.0	991.4	154.8	474
960 min Summer	5.667	0.0	1067.9	160.2	610
1440 min Summer	4.195	0.0	1180.7	146.1	882
2160 min Summer	3.101	0.0	1328.8	113.4	1296
2880 min Summer	2.500	0.0	1427.6	78.9	1704
4320 min Summer	1.843	0.0	1574.7	18.0	2552
5760 min Summer	1.483	0.0	1699.4	0.0	3400
7200 min Summer	1.254	0.0	1795.7	0.0	4176
8640 min Summer	1.093	0.0	1877.3	0.0	4928
10080 min Summer	0.974	0.0	1946.6	0.0	5544
15 min Winter	94.376	0.0	297.6	0.0	19
30 min Winter	63.470	0.0	402.1	0.0	33




AWP		Page 2
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 30 year +40%	
Date 04/07/2017 14:39 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	

Summary of Results for 30 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m <sup>3</sup> )	Status
60 min Winter	99.263	0.563	9.7	2.1	11.7	524.0	O K
120 min Winter	99.366	0.666	10.5	9.6	20.0	619.2	O K
180 min Winter	99.407	0.707	10.8	11.5	22.3	657.4	O K
240 min Winter	99.424	0.724	10.9	12.2	23.1	673.6	O K
360 min Winter	99.444	0.744	11.0	12.9	23.9	691.6	O K
480 min Winter	99.452	0.752	11.1	13.2	24.3	699.6	O K
<b>600 min Winter</b>	<b>99.452</b>	<b>0.752</b>	<b>11.1</b>	<b>13.2</b>	<b>24.3</b>	<b>699.7</b>	<b>O K</b>
720 min Winter	99.448	0.748	11.0	13.0	24.1	695.4	O K
960 min Winter	99.432	0.732	10.9	12.5	23.4	680.5	O K
1440 min Winter	99.393	0.693	10.7	11.0	21.6	644.6	O K
2160 min Winter	99.347	0.647	10.3	8.0	18.4	601.7	O K
2880 min Winter	99.311	0.611	10.0	5.2	15.3	568.4	O K
4320 min Winter	99.246	0.546	9.5	1.1	10.6	507.6	O K
5760 min Winter	99.145	0.445	8.7	0.0	8.7	413.6	O K
7200 min Winter	99.020	0.320	8.7	0.0	8.7	297.8	O K
8640 min Winter	98.920	0.220	8.7	0.0	8.7	204.5	O K
10080 min Winter	98.864	0.164	8.6	0.0	8.6	152.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m <sup>3</sup> )	Discharge Volume (m <sup>3</sup> )	Overflow Volume (m <sup>3</sup> )	Time-Peak (mins)
60 min Winter	40.933	0.0	538.5	4.9	62
120 min Winter	25.625	0.0	675.9	54.8	118
180 min Winter	19.253	0.0	762.6	96.0	174
240 min Winter	15.632	0.0	826.1	125.3	226
360 min Winter	11.644	0.0	923.6	168.0	280
480 min Winter	9.438	0.0	998.3	197.5	356
<b>600 min Winter</b>	<b>8.014</b>	<b>0.0</b>	<b>1059.5</b>	<b>218.4</b>	<b>432</b>
720 min Winter	7.008	0.0	1111.6	232.7	506
960 min Winter	5.667	0.0	1197.5	245.5	652
1440 min Winter	4.195	0.0	1324.1	233.3	936
2160 min Winter	3.101	0.0	1488.9	182.1	1344
2880 min Winter	2.500	0.0	1599.5	125.2	1788
4320 min Winter	1.843	0.0	1764.5	21.4	2724
5760 min Winter	1.483	0.0	1903.8	0.0	3624
7200 min Winter	1.254	0.0	2011.7	0.0	4392
8640 min Winter	1.093	0.0	2103.6	0.0	4928
10080 min Winter	0.974	0.0	2182.1	0.0	5448

AWP		Page 3
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 30 year +40%	
Date 04/07/2017 14:39 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	


Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.329	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.595

Time (mins)		Area
From:	To:	(ha)
0	4	1.595

AWP		Page 4
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 30 year +40%	
Date 04/07/2017 14:39 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	

Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.700

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	930.0	1.300	930.0

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0144-8700-0450-8700
Design Head (m)	0.450
Design Flow (l/s)	8.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	144
Invert Level (m)	98.700
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200


Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.450	8.7
Flush-Flo™	0.211	8.7
Kick-Flo®	0.361	7.8
Mean Flow over Head Range	-	6.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.2	1.200	13.8	3.000	21.4	7.000	32.3
0.200	8.7	1.400	14.9	3.500	23.0	7.500	33.4
0.300	8.4	1.600	15.8	4.000	24.6	8.000	34.5
0.400	8.2	1.800	16.8	4.500	26.0	8.500	35.6
0.500	9.1	2.000	17.6	5.000	27.2	9.000	36.6
0.600	10.0	2.200	18.4	5.500	28.6	9.500	37.7
0.800	11.4	2.400	19.2	6.000	29.9		
1.000	12.7	2.600	20.0	6.500	31.1		

Orifice Overflow Control


Diameter (m) 0.120 Discharge Coefficient 0.600 Invert Level (m) 99.200

AWP		Page 1
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 100 year +40%	
Date 04/07/2017 14:37 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	99.086	0.386	8.7	0.0	8.7	358.9	O K
30 min Summer	99.220	0.520	9.3	0.2	9.5	483.7	O K
60 min Summer	99.355	0.655	10.4	8.7	19.1	609.5	O K
120 min Summer	99.467	0.767	11.2	13.7	24.9	713.6	O K
180 min Summer	99.509	0.809	11.5	15.0	26.5	752.7	O K
240 min Summer	99.526	0.826	11.6	15.5	27.1	767.8	O K
360 min Summer	99.547	0.847	11.7	16.1	27.8	787.6	O K
480 min Summer	99.557	0.857	11.8	16.4	28.1	796.8	O K
600 min Summer	99.559	0.859	11.8	16.4	28.2	798.5	O K
720 min Summer	99.556	0.856	11.8	16.3	28.1	795.8	O K
960 min Summer	99.542	0.842	11.7	16.0	27.6	782.7	O K
1440 min Summer	99.501	0.801	11.4	14.8	26.2	745.2	O K
2160 min Summer	99.442	0.742	11.0	12.8	23.8	690.3	O K
2880 min Summer	99.395	0.695	10.7	11.1	21.7	646.5	O K
4320 min Summer	99.336	0.636	10.2	7.2	17.4	591.0	O K
5760 min Summer	99.292	0.592	9.9	3.8	13.7	550.1	O K
7200 min Summer	99.253	0.553	9.6	1.4	11.0	514.1	O K
8640 min Summer	99.200	0.500	9.1	0.0	9.1	464.8	O K
10080 min Summer	99.137	0.437	8.7	0.0	8.7	406.5	O K
15 min Winter	99.133	0.433	8.7	0.0	8.7	402.3	O K
30 min Winter	99.282	0.582	9.8	3.3	13.1	541.5	O K


Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	121.962	0.0	344.4	0.0	19
30 min Summer	82.861	0.0	468.9	0.2	34
60 min Summer	53.779	0.0	632.9	40.7	62
120 min Summer	33.683	0.0	794.7	123.7	122
180 min Summer	25.213	0.0	893.2	175.3	180
240 min Summer	20.366	0.0	962.4	210.2	208
360 min Summer	15.066	0.0	1068.5	261.0	268
480 min Summer	12.151	0.0	1149.1	296.1	334
600 min Summer	10.275	0.0	1214.5	321.4	402
720 min Summer	8.954	0.0	1269.7	339.9	470
960 min Summer	7.198	0.0	1359.8	359.9	608
1440 min Summer	5.281	0.0	1490.4	354.3	878
2160 min Summer	3.866	0.0	1658.0	314.4	1272
2880 min Summer	3.093	0.0	1768.1	271.6	1648
4320 min Summer	2.255	0.0	1929.0	181.8	2424
5760 min Summer	1.799	0.0	2062.7	98.9	3240
7200 min Summer	1.512	0.0	2166.7	31.2	4104
8640 min Summer	1.312	0.0	2254.5	0.0	4936
10080 min Summer	1.164	0.0	2328.7	0.0	5744
15 min Winter	121.962	0.0	386.3	0.0	19
30 min Winter	82.861	0.0	525.2	8.8	33

AWP		Page 2
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 100 year +40%	
Date 04/07/2017 14:37 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
60 min Winter	99.431	0.731	10.9	12.4	23.4	679.9	O K
120 min Winter	99.562	0.862	11.8	16.5	28.3	801.7	O K
180 min Winter	99.614	0.914	12.1	17.9	30.0	850.0	O K
240 min Winter	99.632	0.932	12.3	18.3	30.6	866.9	O K
360 min Winter	99.651	0.951	12.4	18.8	31.2	884.7	O K
480 min Winter	99.656	0.956	12.4	18.9	31.3	889.5	O K
600 min Winter	99.651	0.951	12.4	18.8	31.2	884.6	O K
720 min Winter	99.640	0.940	12.3	18.5	30.8	874.4	O K
960 min Winter	99.610	0.910	12.1	17.8	29.9	846.4	O K
1440 min Winter	99.544	0.844	11.7	16.0	27.7	784.6	O K
2160 min Winter	99.458	0.758	11.1	13.4	24.5	705.3	O K
2880 min Winter	99.397	0.697	10.7	11.1	21.8	647.9	O K
4320 min Winter	99.328	0.628	10.2	6.6	16.7	584.1	O K
5760 min Winter	99.278	0.578	9.8	3.0	12.8	537.5	O K
7200 min Winter	99.223	0.523	9.3	0.3	9.6	486.5	O K
8640 min Winter	99.126	0.426	8.7	0.0	8.7	396.3	O K
10080 min Winter	99.001	0.301	8.7	0.0	8.7	279.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
60 min Winter	53.779	0.0	709.9	81.9	62
120 min Winter	33.683	0.0	891.1	180.6	118
180 min Winter	25.213	0.0	1001.4	241.0	174
240 min Winter	20.366	0.0	1079.0	282.0	226
360 min Winter	15.066	0.0	1197.8	342.0	278
480 min Winter	12.151	0.0	1288.1	384.0	356
600 min Winter	10.275	0.0	1361.4	415.0	430
720 min Winter	8.954	0.0	1423.3	438.3	506
960 min Winter	7.198	0.0	1524.4	468.7	648
1440 min Winter	5.281	0.0	1671.2	479.7	924
2160 min Winter	3.866	0.0	1857.6	429.3	1320
2880 min Winter	3.093	0.0	1981.0	365.8	1704
4320 min Winter	2.255	0.0	2160.9	225.3	2508
5760 min Winter	1.799	0.0	2310.6	97.0	3408
7200 min Winter	1.512	0.0	2427.3	5.6	4400
8640 min Winter	1.312	0.0	2526.0	0.0	5272
10080 min Winter	1.164	0.0	2610.2	0.0	5952

AWP		Page 3
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 100 year +40%	
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XP Solutions	Source Control 2016.1	


Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.329	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.595

Time (mins)		Area
From:	To:	(ha)
0	4	1.595

AWP		Page 4
Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY	Attenuation Req (Site 1) 100 year +40%	
Date 04/07/2017 14:37 File 0657-SW-03-A (Site 3 - ...	Designed by Toby.Ball Checked by	
XP Solutions	Source Control 2016.1	

Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.700

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	930.0	1.300	930.0

Hydro-Brake Optimum® Outflow Control

Unit Reference	MD-SHE-0144-8700-0450-8700
Design Head (m)	0.450
Design Flow (l/s)	8.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	144
Invert Level (m)	98.700
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.450	8.7
Flush-Flo™	0.211	8.7
Kick-Flo®	0.361	7.8
Mean Flow over Head Range	-	6.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.2	1.200	13.8	3.000	21.4	7.000	32.3
0.200	8.7	1.400	14.9	3.500	23.0	7.500	33.4
0.300	8.4	1.600	15.8	4.000	24.6	8.000	34.5
0.400	8.2	1.800	16.8	4.500	26.0	8.500	35.6
0.500	9.1	2.000	17.6	5.000	27.2	9.000	36.6
0.600	10.0	2.200	18.4	5.500	28.6	9.500	37.7
0.800	11.4	2.400	19.2	6.000	29.9		
1.000	12.7	2.600	20.0	6.500	31.1		

Orifice Overflow Control

Diameter (m) 0.120 Discharge Coefficient 0.600 Invert Level (m) 99.200



## Appendix G Utility Supply Sheet





## Utility Supply/Diversion Summary Sheet

Purbeck Promotion Sites for Wyatt

Job Number:	0657
Revision - Date:	B - 17/07/17

Utility	Company	Quote	Reinforcement	Provider Contact Details	Summary/Comments	Lead in time
Gas	Scotia Gas Networks (SGN)	£80,500 (inc. VAT) details	Reinforcement: None specified Supply: N/A Diversion: Not Included	Will Tambrescu will.tambrescu@sgn.co.uk Tel: 01293 818380 Ref: 1411490	SGN Connections to install gas infrastructure from existing main in Wimborne Road, SGN will carry out necessary excavation and reinstatement within the public highway. The customer is responsible for the excavations and reinstatement within the private land. SGN will supply and install 1 x MP/LP district governor. No individual home meter work was included within the estimate.	Not Specified
Electricity	Scottish & Southern Electricity (SSE)	£142,000 (exc. VAT) details	Reinforcement: None specified Supply: N/A Diversion: None required	Graham Bendall graham.bendall@sse.com Ref: EJR782-EJR799-EJR814	It is estimated that each potential development site will require the installation of a 11 kV feeder from the network. It is also estimated that one sub-station per site will be required. The preliminary estimates have been based on the assumption that homes will not be electrically heated and no diversion/reinforcement will be required at the sites (however correspondence from SSE suggests that diversion is likely).	Not Specified
Water	Wessex Water (WW)	EX (inc. VAT) details	Reinforcement: None specified Supply: N/A Diversion: None required	EXAMPLE: Angie Brown DeveloperServicesPlanning@southwestwater.co.uk 01392 443661 Ref: WR 2749372		X weeks
Telecoms	Openreach	£0 (inc. VAT) details	Reinforcement: None specified Supply: N/A Diversion: None required	Aaron Leverett aaron.leverett@openreach.co.uk Ref: Form 9964-7221	Openreach will deploy FTTP, free of charge, into all new housing developments of 30 houses or more. Fibre-optic cabling within the development will also be provided free of charge. This does not appear to include diversion of their network (if required).	Not Specified
	Virgin Media	EX (inc. VAT) details	Reinforcement: None specified Supply: N/A Diversion: None required	EXAMPLE: Morag Dawson Morag.Dawson@virginmedia.co.uk Tel: 01392 200632 Mob: 07985 807672 Ref: VM/CIP/253444		X weeks